

Enzyme Activity and Diffusivity of Alkaline Phosphatase Functionalized nanoparticles (MSc Seminar)

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ABSTRACT: Enzymes are proteins found in organisms that work as biological catalysts. In the last decade, some studies have reported that enzymes diffuse faster during catalysis, and recently others have shown the possibility of making enzyme-powered micromotors. We studied the enzyme alkaline phosphatase attached by glutaraldehyde coupling, to spherical polystyrene particles with a diameter of 200 nm using differential dynamic microscopy (DDM) and dynamic light scattering (DLS) to obtain the diffusion coefficient of those particles compared to bare particles in the same size looking for any enhanced particles motion. We will report on the existence (or absence) of enhancement in diffusivity. The enzyme activity of our alkaline phosphatase functionalized nanoparticles was found to be slightly lower than the bare alkaline phosphatase activity. In order to validate our DDM setup, we studied a range of particle sizes (60 nm-1 micron) suspended in water to find the optimal settings for each size in that range. Using previously published Python code modified by our group, we analyzed thousands of frames (images) with the speed of hundreds of frames per second for each measurement. All measurements were compared to DLS measurements on the same samples (but more diluted) for comparison.

ALL ARE WELCOME!